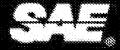
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Automotive Handbook





080 functions

Whereas EOSD and EPA OSD only prescribe few explicit emission reduction systems and provide detailed monitoring regulations, the specific requirements of the CARS OSD II are much more detailed. A further review was made for the model years from 2004 (OSD I update). The list below shows the current state of the CARS requirements (from model year 2004) for gasoline-engined and dieselengined passenger cars. (E) identifies the requirements that also apply to EOSD.

- Catalytic converter (E), heated catalytic converter,
- Combustion (mistire) misses (E; dieset system; not for EOSD),
- Evaporation reduction system (tank-leak diagnosis, only for gasoline system).
- Secondary-air injection,
- Fool system.
- Oxygen (lambda) sensors (E),
- Exhaust-gas recirculation,
- Crankcase ventilation,
- Cooling system.
- Cold-sixti emission reduction system,
- Air conditioner (components),
- Variable valve timing (at present only for gasoline systems);
- Direct ozone reduction system,
- Particulate filter (soot filter, only for disset system) (E).
- "Comprehensive components" (E),
- "Other emission-related components" (E).

Some of the components listed here are categorized as "comprehensive components" or "other emission-related components" with EOBO and EPA. These categories have the following meaning:

- Other components or subsystems of the emission reduction system, or
- Emission-relevant components connected to a computer, or
- Orivetrain subsystems, which, if they
 mailunction or become defective, may
 result in exhaust-gas emissions exceeding the OSD emission limits or the
 disabling of other diagnostic functions.

Catalytic converter diagnosis

Gasoline aystem

This diagnostic function monitors the conversion efficiency of the three-way calabytic conventer. This is measured by the catalytic converter's oxygen retention capability. Monitoring is performed by observing the signals from the Lambda oxygen sensors in reaction to a specific atteration of the setpoint value of the lambda closed-loop control.

Additionally, the NO, accumulation capacity (catalytic-converter quality factor) must be assessed for the NO, accumulator-type catalytic converter. For this purpose, the actual NO, accumulator content resulting from consumption of the reduction agent during regeneration of the catalytic converter is compared with an expected value.

Diesel system

In the diesel system, carbon monoxide (CO) and unburned hydrocarbons (HC) are oxidized in the oxidation-type catalytic converter (to minimize pollutants, see P. 718). There is ongoing development on diagnostic functions to monitor the operation of the oxidation-type catalytic converter based on temperature and differential pressure.

At the same time, work is underway on developing monitoring functions for the accumulation and regeneration capabilities of the NO₂ accumulator-type catalytic converter that will also be installed in the diesel system in the future.

Combustion-miss detection

A mistire or combustion miss results in an increase in HC and CO emissions. The mistire detector evaluates the time expired (segment time) from one combustion to the next for each cylinder. This time is derived using the speed-sensor signal. A segment time that is longer compared to the other cylinders indicates a mistire.

Fuel injection is disabled at the cylinder concerned if the misfire rates exceed permissible levels (gasoline system).

in the dissel system, diagnosis of combustion misses is only required and performed when the engine is at idis. gas-filled gap to the ground electrode. As less ignition voltage is required for discharging across the surface than for discharging across an air gap of the same size, the surface gap spark can bridge bigger electrode gaps than the air gap spark given the same ignition voltage. The resulting larger flame core improves ignition properties considerably.

These spark-plug concepts also have much better repeat cold-starting performance because the surface-gap spark cleans the insulator end-face, or prevents sool from settling there.

Semi-surface gap concepts (c)

In these spark-plug concepts, the ground electrodes are positioned at a specific distance from the center electrode and the end face of the ceramic insulator. Two alternative spark gaps are created as a result, thus allowing both forms of discharge with different lightion voltage requirements. Depending on operating conditions, the spark behaves either as an airgan spark or a surface-gap spark.

Spark-plug operating performance Changes in operation

As the spark plug operates in an aggressive atmosphere, sometimes at high temperatures, the electrodes will wear, thus increasing the ignition voltage requirement. When this requirement can iso longer be met by the supply from the ignition coil, misting will occur.

Oid and changes in the engine caused by aging (e.g. higher oil consumption) can also affect operation of the spark plug. Deposits on the spark plug can result in shurts, and thus in mistring. This, in turn, may cause a considerable rise in pollutant emissions, and even damage the catalytic converter. The spark plugs must therefore be replaced at regular intervals.

Electrode wear

Electrode wear is the erosion of electrode material. As a result, the electrode gap grows, the longer the spark plug is in service. There are assentially two mechanisms that are responsible for this:

- Spark erosion.
- Corresion in the combustion chamber

Materials with a high thermal resistance (e.g. platinum and piatinum alloys) are used to minimize electrode wear. Material wear can also be reduced for the same period of use, by appropriate selection of electrode geometry and spark-plug concept (surface-gap spark plugs).

The resistor in the conductive glass seal reduces burn-off, and thus helps to reduce wear.

Abnormal cossisting conditions

Abnormal operating conditions (auto-ignition, combustion knock, etc.) can damage the engine and spark plage beyond repair.

The engine and the space plags my sustain damage due to incorrectly set ignifion systems, the use of space plags whose heat range is unsuitable for the engine, or the use of unsuitable fuels.

Auto-ignilian

Auto-ignition is an uncontrolled ignision process where the temperature in one spot in the combustion chamber (e.g. at the spork-plug insulator nose, at the exhaust valve, or at the cylinder-head gashels) may rise to such an extent that serious damage is caused to the engine and spark plug.

Combustion knock

Knock is uncontrolled combustion with a very steep pressure rise (see P. 619). The combustion process is considerably faster than normal combustion. One to high pressure gradients, the components (cylinder head, velves, pistons, and spark plugs) are subjected to high temperature loads. This may result in damage to one or several of the components (see knock control, P. 621).

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